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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/521,453	01/14/2005	Shigeo Maruyama	1152-0314PUS1	8796
2292 7590 10/22/2007 BIRCH STEWART KOLASCH & BIRCH PO BOX 747 FALLS CHURCH, VA 22040-0747			EXAMINER MCCRACKEN, DANIEL	
			ART UNIT 1793	PAPER NUMBER
			NOTIFICATION DATE 10/22/2007	DELIVERY MODE ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

Office Action Summary

Application No.

10/521,453

Applicant(s)

MARUYAMA ET AL.

Examiner

Daniel C. McCracken

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 January 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 12-32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 12-32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Citation to the Specification will be in the following format (S. # : L) where # denotes the page number and L denotes the line number. Citation to patent literature will be in the form (Inventor # : LL) where # is the column number and LL is the line number. Citation to the pre-grant publication literature will be in the following format (Inventor # : ¶) where # denotes the page number and ¶ denotes the paragraph number.

Specification

A substitute specification *including* the claims is required pursuant to 37 CFR 1.125(a) because the number of amendments to the specification needed to correct all of the deficiencies would make it difficult to consider the application.

A substitute specification in proper idiomatic English and in compliance with 37 CFR 1.52(a) and (b) is required. The substitute specification filed must be accompanied by a statement that it contains no new matter.

The Specification suffers from poor diction, syntax, and grammatical form, possibly from a machine translation from Japanese. For example, Applicants state: "Attentions are paid to most to a carbon nanotube among fine carbon fibers." (S. 1: 13-14). (noting, among other things, the use of the passive voice). If this sentence reads well in Japanese, it does not read well in English. This is the *second sentence* of the application. It goes without saying, *many other instances* of this "style" of writing are present in the application. This "style" makes it difficult to properly construe claims and focus a search. A thorough and thoughtful review of the specification is required to correct any and all deficiencies. The Examiner does not write his office actions in the following form: "Firstly, great confusion and misunderstanding is long felt by un-proofreading machine translations provided." Applicants are expected to extend the same courtesy.

A substitute specification must not contain new matter. The substitute specification must be submitted with markings showing all the changes relative to the immediate prior version of the specification of record. The text of any added subject matter must be shown by underlining the added text. The text of any deleted matter must be shown by strike-through except that double brackets placed before and after the deleted characters may be used to show deletion of five or fewer consecutive characters. The text of any deleted subject matter must be shown by being placed within double brackets if strike-through cannot be easily perceived. An accompanying clean version (without markings) and a statement that the substitute specification contains no new matter must also be supplied. Numbering the paragraphs of the specification of record is not considered a change that must be shown.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 12-32 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 12-13 recite “by a method of thermal decomposition of at least one organic compound containing VIB group element in the periodic table in a molecule using a ultra fine particles comprising at least one transition metal as a catalyst.” When Applicants rewrite the claims as required above to correct all grammatical errors (like the lack of agreement between the article “a” and the object “particles”), Applicants should recite what elements comprise Group VIB. Different nomenclature conventions exist for the periodic table. Presumably, in

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accordance with the passage at (S. 12: 3 *et seq.*), Applicants “mean” the group on the periodic table containing oxygen, sulfur, selenium, etc. (Group 15 by IUPAC designation). The Examiner has a periodic table that lists Group 15 as *Group VIA*, while Group VIB refers to chromium, molybdenum, tungsten, etc. Language that creates an artificial genus (i.e. *Markush* language), supported by the specification, would be suitable. Further, Claims 12-13 are incomplete for omitting essential steps, such omission amounting to a gap between the steps. *See* MPEP § 2172.01. Alternatively, the claims omit essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. *See Id.* Alternatively, the claims are rejected as prolix. *See* MPEP 2173.05(m). Both claims set forth a laundry list of apparatuses but do not relate them to one another or to the process as a whole. Can the carrier gas feeding part be connected to the fine carbon fiber tank which is in turn connected to the reaction furnace which is connected to the second fine carbon fiber-separating and collecting apparatus?

Applicants should focus their claims to recite positive process step (i.e. “reacting A with B at temperature T to get C; separating C from D; cooling C; recycling D” etc.). If Applicants are pursuing an apparatus, the claims should be written as such, at which time it will be restricted.

Because of the serious deficiencies noted above, especially in regards to what is Group VI, a proper search of the prior art is not possible. The following is offered for the sake of completeness: All that is arguably ascertainable from the specification - yet not clear from the claims - is that an organic compound containing a group VIB element (which is presumably O, S, Se, etc.) is reacted with a transition metal catalyst in a furnace, and at some point thereafter the fibers are separated from the gas and the gas is recycled.

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Claims 16, 17, 18, 19 and 24-32 all recite the language “in any of claim ____.” This makes no sense when the claims depend upon one claim. While it is proper to correct multiple dependency issues when filing a U.S. case, it is also proper to make sure they “read well.” Appropriate correction is expected.

All other claims import the defects mentioned above by nature of their status as dependent claims.

Priority

As an intervening reference – that is one inbetween Applicants’ foreign priority date and their US (35 U.S.C. 371) date has been applied, Applicants are requested to provide a translation of their foreign priority documents. *See* MPEP 201.15. Rejections were made in the alternative (i.e. 102(a)/102(b)) where appropriate.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The entire reference teaches each and every limitation of the rejected claims. The pinpoint citations provided are in no way to be construed as limitations of the teachings of the reference, but rather illustrative of particular instances where the teachings may be found.

Claims 12-13 are rejected under 35 U.S.C. 102(a) and alternatively under 35 U.S.C. 102(b) as being anticipated by Maruyama, et al., *Low-temperature synthesis of high-purity single-walled carbon nanotubes from alcohol*, Chemical Physics Letters 2002; 360: 229-234 (hereinafter “Maruyama at ___”). The Japanese priority date of 7/17/2002 and the publication date of Maruyama (10 July 2002) serve as the basis for the rejection under 102(a). The US (35 U.S.C. 371) filing date serves as the basis for the rejection under 35 U.S.C. 102(b).

Maruyama recites a process for making carbon nanotubes with an iron or cobalt catalyst and an alcohol (that is, an “organic compound containing VIB group element in the periodic table”). (Maruyama at 230) (“2. Experimental”): The standard quartz tube furnace reactor is recited. *Id.* The quartz boat can be interpreted as separating and collecting apparatuses. Alternatively, the “microgrid” can be interpreted as the collecting and separating apparatus. (Marayuma at 230) (3. Results and discussion).

Claims 12-13 are rejected under 35 U.S.C. 102(b) as being anticipated by US 3,378,345 to Bourdeau, et al.

Bordeau recites heating oxygen containing organic compounds in a reaction furnace to obtain fine carbon fibers (referred to as graphite whiskers). *See e.g.* (Bordeau 2: 44-45) (“oxygen containing organic compounds”), (Bordeau 2: 9) (“methylo1”), *and* (Bordeau 2: 61) (describing a furnace). Bourdeau recites a tantalum surface for growing the fibers (i.e. a transition metal catalyst). (Bordeau 3: 3). The mandrel recited is being interpreted as the fiber collection/separation apparatus. (Bordeau 3: 8-11).

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Claims 12-13 rejected under 35 U.S.C. 102(b) as being anticipated by Lyu, et al, *Synthesis and characterization of high-quality double-walled carbon nanotubes by catalytic decomposition of alcohol*, Chem. Commun. 2003: 1404-1405 (hereinafter "Lyu at ____"). Applicants' US (35 U.S.C. 371) date and the web publishing date of the Lyu article (12 May 2003) serve as the basis for the rejection under 35 U.S.C. 102(b).

Lyu recites the synthesis of nanotubes from an alcohol (i.e. a group VIB element containing compound) utilizing an iron (i.e. transition metal) catalyst in a furnace. *See generally* (Lyu at 1404).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various

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claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

The entire reference teaches each and every limitation of the rejected claims. The pinpoint citations provided are in no way to be construed as limitations of the teachings of the reference, but rather illustrative of particular instances where the teachings may be found.

Claims 12-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maruyama, et al., *Low-temperature synthesis of high-purity single-walled carbon nanotubes from alcohol*, Chemical Physics Letters 2002; 360: 229-234 (hereinafter "Maruyama at ___").

The discussion accompanying the anticipation rejection over Maruyama *supra* is expressly incorporated herein. To the extent Maruyama may not recite a gas recycle, this is an obvious expedient one of ordinary skill in the art would employ for any number of reasons, including cost savings associated with reusing unreacted alcohol. To the extent Maruyama may not recite the temperature ranges claimed, Maruyama clearly demonstrates that temperature is a result-effective variable, and invites optimization. *See* (Maruyama, 230-231) ("By optimizing [temperature], probably a better sample can be produced at even lower temperature."). "[D]iscovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art." *In re Boesch*, 205 USPQ 215, 219 (CCPA 1980) (citations omitted).

Claims 12-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 3,378,345 to Bourdeau, et al.

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The discussion accompanying the anticipation rejection over Bourdeau *supra* is expressly incorporated herein. To the extent Bourdeau may not recite a gas recycle, this is well within ordinary skill in the art (presumably one with knowledge of basic chemical engineering principles). One of ordinary skill in the art would be motivated to employ a recycle stream for any number of reasons, for example the cost savings associated with reusing unreacted feed. Similarly, one of ordinary skill in the art would employ conventional “carbon fiber and collecting apparatus” to enhance product purity. All process variables are optimizable. *In re Boesch*, 205 USPQ 215, 219 (CCPA 1980) (citations omitted).

Claims 12-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lyu, et al, *Synthesis and characterization of high-quality double-walled carbon nanotubes by catalytic decomposition of alcohol*, Chem. Commun. 2003: 1404-1405.

The discussion accompanying the anticipation rejection over Lyu *supra* is expressly incorporated herein. To the extent Lyu may not recite a gas recycle, this is well within ordinary skill in the art (presumably one with knowledge of basic chemical engineering principles). One of ordinary skill in the art would be motivated to employ a recycle stream for any number of reasons, for example the cost savings associated with reusing unreacted feed. Similarly, one of ordinary skill in the art would employ conventional “carbon fiber and collecting apparatus” to enhance product purity. All process variables are optimizable. *In re Boesch*, 205 USPQ 215, 219 (CCPA 1980) (citations omitted).

Conclusion

Candidly speaking, the claims do not read well. They were corrected for multiple dependency issues before filing in the United States, but not for much else. Similarly, the specification is replete with grammatical errors, making examination difficult. No patent shall issue unless these are corrected. Before the Examiner can make a *prima facie* case, it is of *course* the Applicants' burden to particularly point out and distinctly claim that which they regard as their invention. 35 U.S.C. 112, ¶2. Applicants have not done so here. The recitation of a host of unit operations without something to connect them is insufficient and improper.

Before Applicants or their counsel launch into an attack as to how the Examiner failed to meet his burden, an examination of whether Applicants met their burden is necessary. The Examiner submits that *that* burden (i.e. the burden of claiming the invention) has not been met. Insofar as anything could be ascertained from the claims and the specification, the Examiner targeted the search at what was allegedly (in the Examiner's opinion) novel – namely the synthesis of carbon fibers from alcohols (or “organic compound containing VIB group element in the periodic table in a molecule[s]”). Everything else (i.e. gas phase synthesis from a transition metal catalyst, recycle, etc.) is either old and known, or readily optimized by one of ordinary skill in the art.

The search uncovered several intervening references that are made of record as being relevant to Applicants' disclosure:

1. Maruyama, et al., *Synthesis of single-walled carbon nanotubes with narrow diameter-distribution from fullerene*, Chemical Physics Letters 2003; 375: 553-559.

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2. Maruyama, et al., *Optical characterization of single-walled carbon nanotubes synthesized by catalytic decomposition of alcohol*, New Journal of Physics 2003; 5: 149.1-149.12 (online at <http://www.njp.org/>)
3. Miyauchi, et al., *Fluorescence spectroscopy of single-walled carbon nanotubes synthesized from alcohol*, Chemical Physics Letters 2004; 387: 198-203.

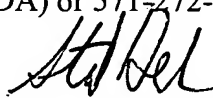
All amendments made in response to this Office Action must be accompanied by a pinpoint citation to the Specification (i.e. page and paragraph or line number) to indicate where Applicants are drawing their support.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel C. McCracken whose telephone number is (571) 272-6537. The examiner can normally be reached on Monday through Friday, 9 AM - 6 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley S. Silverman can be reached on (571) 272-1358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


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